2016 • Fourth Quarter Issue

MileMarker

A CALTRANS PERFORMANCE REPORT

In This Issue

West Coast Electric Highway Grows
Caltrans Begins Task of Boosting Infrastructure 14

The 10-Year Spending Plan
California First to Comply with New Federal Guidelines 20

Road Charge Pilot Program
Participants Testing Multiple Mileage Reporting Methods 10

Director's Message

I'm a firm believer that Caltrans is a premier transportation organization. I also believe that we need to continue to change if we want to grow as an organization. We laid the foundation for our path to change two years ago with the implementation of our new Strategic Management Plan. That plan is taking us in the right direction and you all are the driving force.

The plan is something we can all be proud of, setting our objectives and dozens of performance measures that allow us to track our progress. One of those goals is Organizational Excellence, which means we need to deliver quality service to the public through excellent employee performance, public communication and accountability.

The *Mile Marker* is instrumental in helping us reach that goal. This current issue has greatly expanded the dashboard used to track our performance measures (see page 4), better fulfilling its mission than it had done in previous issues. These measures are like flags that we plant on the horizon, guiding us to where we want to go. Everyone in the organization contributes to achieving these goals.

These measures are like flags that we plant on the horizon, guiding us to where we want to go.

The *Mile Marker*, like our successful News Flash videos, tells our story, describing to all of us at Caltrans as well as elected officials, our partners and the general public, what it is that we do. But the *Mile Marker*, in the end, is a performance report. That's why I'm excited to see an update to dozens of performance measures in the dashboard.

Our recent internal employee survey is reflected in the measurements for Organizational Excellence, including 49 percent of respondents who said the *Mile Marker* helped them to understand what the department does, compared with 37 percent a year ago. We're looking forward to seeing the results of our external survey, which is being conducted through December (to take the survey, visit the Caltrans website at www.dot.ca.gov). Both surveys will be used to show us where we have opportunities to improve.

This progress, of course, means change toward a more sustainable future, not just for Caltrans, but for all Californians who depend on our transportation system to safely deliver people and goods to their destinations, and to keep our environment clean and our economy strong. MM

Malcolm Dougherty, *Director of Caltrans*

Cover: *Caltrans added 20 new hydrogen fuel cell vehicles to its light-duty fleet, first sending these Toyota Mirais to the department's equipment shop in Sylmar, where they were customized. Zero-emission vehicles (see story, page 14) are a cornerstone of California's long-term energy strategy to reduce greenhouse gas emissions. Photo by Thomas Ritter*

Inside this Issue

Mile Markers	4
Road Charge Pilot Program	10
West Coast Electric Highway Grows	14
Feds Reward Caltrans With Extra Funds	18
A Single Plan	20
New Laws Lineup	25
Cleaner Locomotive Fleet Powers Up	31
Culvert Inventory Findings	33
Active Transportation Lands $10 Million	35
Project Delivery Process Tested	37
From the Archives	40

Cleanup Costs Jump

Fish Passages

Raise 80

Caltrans' mission is to provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

Caltrans Mile**Markers**

PERFORMANCE GOALS

Safety and Health

Fatalities	2013*	Goal	Status
Auto Fatalities per 100 Million Miles	0.67	Less than 0.5	⌛
Pedestrian Fatalities	257	Reduce 10% Annually	⌛
Bicycle Fatalities	30	Reduce 10% Annually	⌛

** Most recent Caltrans data available*

Programmed vs. Allocated Active Transportation Funds to Date				
	Fiscal Year	% of Programmed Funds Allocated	Goal	Status
First Call for Projects	2014-15	99%	100%	⌛
	2015-16	41%		
Second Call for Projects	2016-17	30%	100%	↑
	2017-18	0%		
	2018-19	0%		

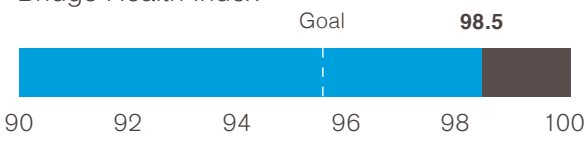
Other Safety and Health Markers	Previous Reporting	Most Recent	Goal	Status
Percentage of Active Transportation Projects Awarded Within Six Months	96% | 2015-16, Q4	**82.5%** | 2016-17, Q1	100%	⌛
Employee Work-Related Injuries/Illnesses per 200,000 Hours Worked	6.37 | 2015-16, Q4	**6.2** | 2016-17, Q1	5.45	↑
Improvement of Collision Data Collection and Processing	First Reporting	**50%** | 2016-17, Q1	100%	⌛
Number of Injuries For Autos, Bicycles and Transit Modes of Travel	76,006	77,222 | 2013	Reduce 5% Annually	⌛
Worker Fatalities in Work Zones	0	**1** | 2016	0 Per Calendar Year	↓

Status of Caltrans Mile**Markers** Performance Goals are represented using the following four icons:

✓ Currently Met ↑ Trending Positive ↓ Trending Negative ⌛ Future Reporting

Stewardship and Efficiency

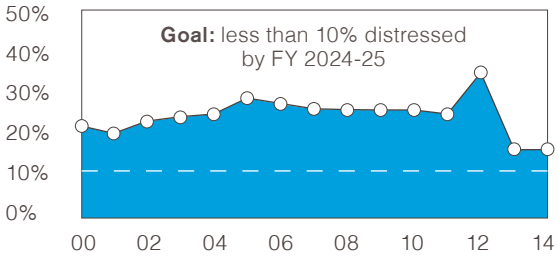
Bridge Health Index **



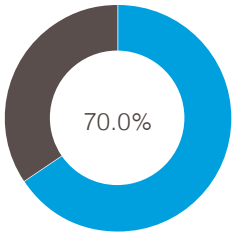
Goal	2014-15	2015-16	Status
Better than 95 rating by 2020	97.4	**98.5**	

Pavement Health Index **

Status

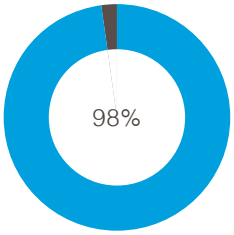


Percentage of Intelligent Transportation Systems in Working Order **



Goal	90% by 2020
Oct.-Dec. 2015	65.6%
July-Sept. 2016	**70.0%**
Status	

Planned Projects Delivered in Fiscal Year



Goal	100%
2014-15	98%
2015-16	**98%**
Status	

** *This data was compiled using a measurement that is expected to be replaced by a new rating system in early 2017.*

Information Technology Projects	2015-16, Q4	2016-17, Q1	Goal	Status
Advantage System Analysis Uptime	97.79%	**88%**	99% by 2020	
Network Analysis Uptime	99.34%	**99.18%**	99.5% by 6/30/18	
Response to Employee IT Requests Within Two Hours	34.24%	**36.8%**	40% by 6/30/18	

Annual Percentage of Research Projects With Implementable Solutions	2015-16 (first reporting)	2016-17 Goal	2020 Goal	Status
Caltrans Research	**50%**	55%	75%	
University Transportation Centers (UTC) Research	**20%**	24%	40%	
National Cooperative Research	**10%**	12%	20%	

Caltrans Mile**Markers**

PERFORMANCE GOALS

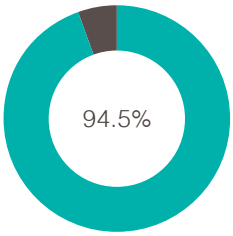
Stewardship and Efficiency (continued)

Encroachment Permits Approved or Denied Within 30 Days *

Goal	95%
2015-16, Q4	75%
2016-17, Q1	**73%**
Status	ⓘ

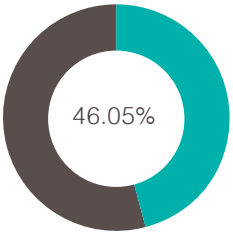
** District 6 is conducting a LEAN 6 Sigma Pilot Project to improve processing time*

Percentage of Online Single-Trip Permit Requests Handled in Less Than Two Hours



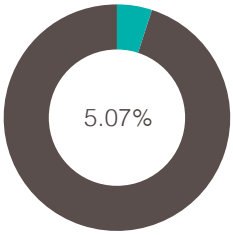
Goal	90%
2015-16, Q4	94.5%
2016-17, Q1	**94.1%**
Status	✓

Contract and Procurement Dollars Awarded to Small Businesses Annually



Goal	25%
2014-15	25%
2015-16	**46.05%**
Status	✓

Contract and Procurement Dollars Awarded to Disabled Veteran Business Enterprises Annually

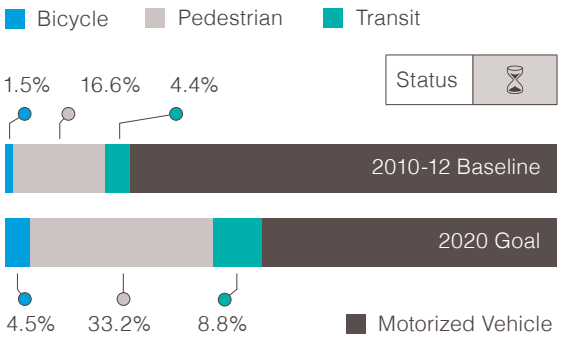


Goal	5%
2014-15	5%
2015-16	**5.07%**
Status	✓

Other Stewardship and Efficiency Markers	Previous Reporting	Most Recent Reporting	Goal	Status
Federal Funds Used in Year of Availability (Annual)	100%	**100%** | 2015-16	100%	✓
Architectural & Engineering (A&E) Contracts Awarded Within Established Timeframes	0 | 2015-16, Q4	**0** | 2016-17, Q1	95%	ⓘ
Americans with Disabilities Act (ADA) Expenditures Programmed	No Previous	**$39.8 Millon** | 2015-16	$35 Million	✓

Sustainability, Livability and Economy

Percentage of Commutes



Vehicle Miles Traveled Per Capita, Statewide Average

Goal	By 2020, 15% lower than 2010 baseline
2010 Baseline	13,373
2013*	**11,947 I -10.7%**
Status	⏳

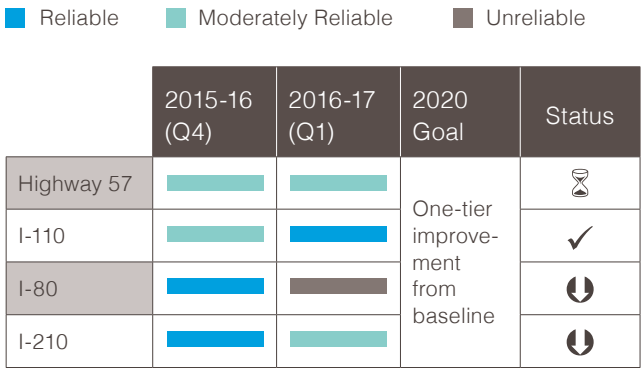
** Most recent Caltrans data available*

Greenhouse Gas Emissions from Caltrans Operations

Goal	By 2020, 15% lower than 2010 baseline
2010 Baseline	214,983
2015	**164,173 I -23.6%**
Status	⏳

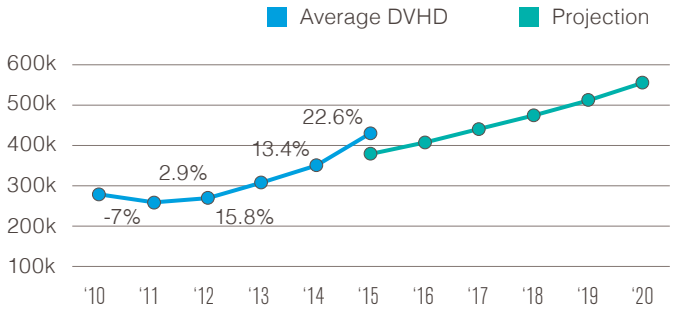
System Performance

Travel Time Reliability (2015)



	2015-16 (Q4)	2016-17 (Q1)	2020 Goal	Status
Highway 57			One-tier improvement from baseline	⏳
I-110				✓
I-80				⬇
I-210				⬇

Average Growth in Daily Vehicle Hours of Delay (DVHD) vs. Projection



Goal	Reduce to an 8% rate of growth by 2020

Status: ⬇

Other System Performance Markers	Previous Reporting	Most Recent Reporting	Goal	Status
Accurate Reporting of Traveler Information (Travel Times, Construction Activity, Incidents, and Adverse Weather)	93.7% | 2014-15	**94.0%** | 2015-16	85%	✓
Provide Real-Time Multimodal System Information Available to the Public (Number of Corridors)	0 | 2015-16, Q4	**3** | 2016-17, Q1	2	✓
Completed Corridor Implementation Plans	0 | 2015-16, Q4	**3** | 2016-17, Q1	2	✓
Number of Corridors With Integrated Corridor Management Implementation	0 | 2015-16, Q4	**2** | 2016-17, Q1	1	✓

Caltrans Mile**Markers**

PERFORMANCE GOALS

System Performance (continued)

Complete Streets Implementation Action Plan 2.0	Previous Reporting	Most Recent Reporting	Goal	Status
Annual Number Complete Streets Projects	No Previous	**33%** | 2015-16, Q4	39% by 2020	⏳
Number of Complete Streets Features	No Previous	**1,264** | 2015-16, Q4	1,327 by 2020	⏳
Percentage of Fully Implemented High-Focus Actions	14% | 2015-16, Q4	**36%** | 2016-17, Q1	80% by 2016	◐

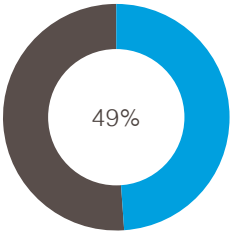
Average All-Stations On-Time Performance for Intercity Rail	2016, Q2	2016, Q3	Goal	Status
Capitol Corridor	95.0%	**95.7%**	90%	✓
Pacific Surfliner	88.1%	**87.6%**	90%	◑
San Joaquin	76.6%	**87.4%**	90%	◐
End Station On-Time Performance for Intercity Rail	**2016, Q2**	**2016, Q3**	**Goal**	**Status**
Capitol Corridor	93.0%	**94.1%**	90%	✓
Pacific Surfliner	77.9%	**78.0%**	90%	◐
San Joaquin	73.5%	**84.0%**	90%	◐

Daily Vehicle Hours of Delay (Top Four Integrated Corridors)	2015-16, Q4	2016-17, Q1	Goal	Status
Highway 57	Not Available	**-10.2%**	Less Than 6% Increase Annually	✓
I-110	Not Available	**Data Pending**	Less Than 6% Increase Annually	⏳
I-80	Not Available	**4.9%**	Less Than 6% Increase Annually	◑
I-210	Not Available	**Data Pending**	Less Than 6% Increase Annually	⏳

Take the 2016 Caltrans External Stakeholder Survey! Scan the QR Code with your phone camera and go straight to the survey website.

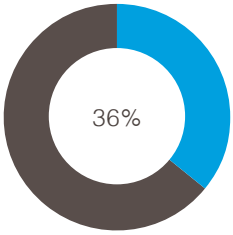
Organizational Excellence

Stakeholders Who Gave Positive Feedback About *Mile Marker* in Annual Survey



Goal	5% Annual Improvement From 2015 Baseline
2015	External 43%, Internal 37%
2016	(External Data Pending) **Internal: 49%**
Status	✓

Stakeholders Who Feel That Department Communication, Professionalism, and Service Levels Have Improved



Goal	5% Annual Improvement From 2015 Baseline
2015	External 36% Internal 32%
2016	(External Data Pending) **Internal 36%**
Status	ⓘ

Other Organizational Excellence Markers	2015	2016	Goal	Status
Employees Who Indicate That They Work in a Positive Environment	50%	**57%**	55%	✓
Abusive Conduct Prevention Trainings Provided Per Year	37%	**72%**	50%	✓
Caltrans Employees Who Agree That Employees Are Encouraged to Try New Ideas	40%	**47%**	75%	◐
External Survey Respondents Who Said Caltrans Doing a Good or Excellent Job in Meeting Their Needs	40%	**Data Pending**	75%	⧗
Documented Process Improvements	30	**36**	30	✓
Caltrans Employees Who Rate Caltrans Management as Open and Honest in Communications	44%	**51%**	49%	✓
Mile Marker Publications Produced on Quarterly Schedule	9	**10**	10	✓
Positive Responses to Ethics Questions on Employee Survey	79%	**81%**	83%	◐
Eligible Employees Who Have Completed Leadership and Development Training Programs, per Fiscal Year	23%	**Data Pending**	85%	⧗
Increase in the Number of Partners Who Agree or Strongly Agree That Caltrans is a Collaborative Partner	40%	**Data Pending**	75%	⧗
Increase in Employees Serving on Research and Policy Committees	40	**38**	43	ⓘ
Number of Caltrans Employees Trained as LEAN 6 Sigma Green Belts	13 | 2015-16, Q4	**18** | 2016-17, Q1	10	✓
Number of Caltrans Employees Trained as LEAN 6 Sigma White Belts	35 | 2015-16, Q4	**192** | 2016-17, Q1	150	✓

Road Charge Pilot Program

Participants Testing Multiple Mileage Reporting Methods

Caltrans photo by Steven Hellon

The Azuga device, which plugs into a vehicle, allows drivers participating in the Road Charge Pilot Program to chart mileage and other information. The data will help determine if a mileage-based program for transportation financing is viable.

Eight out of 10 volunteers in California's per-mile Road Charge Pilot Program (RCPP) chose to let technology report their mileage rather than doing it manually, and after several months of use, 76 percent say the process is easy and they are satisfied with their choice, according to a survey completed in August 2016.

Several states are testing mileage-based programs to replace existing gasoline taxes. California's is largest, with more than 5,000 vehicles enrolled.

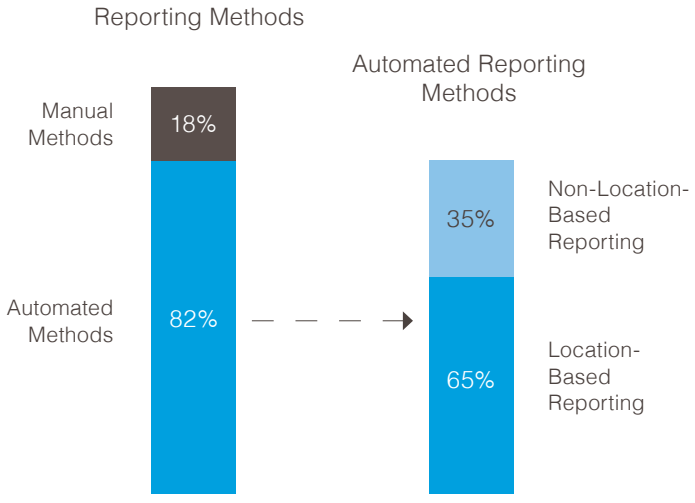
Participants receive mock "invoices" each month and make simulated "payments" based on their mileage driven, but no actual money is involved.

Among the private vehicles enrolled in the pilot program, 82 percent of participants opted for an automated mileage reporting method while the remaining 18 percent chose a manual method. The protection of privacy has been a critical element in designing the pilot. However, despite privacy concerns, 65 percent of participants using the automated method chose to use a location-based mileage reporting method.

Halfway through the nine-month pilot, participants will have the opportunity to try other reporting methods and change their Account Manager (see chart). Participants are continually engaging with the program team, through surveys and opportunities, to rate their satisfaction with various aspects of the pilot before it ends in March 2017.

The federal government, recognizing California's efforts to research alternatives for transportation funding, granted Caltrans $750,000 through the Fix-

Road Charge Participant Reporting Methods

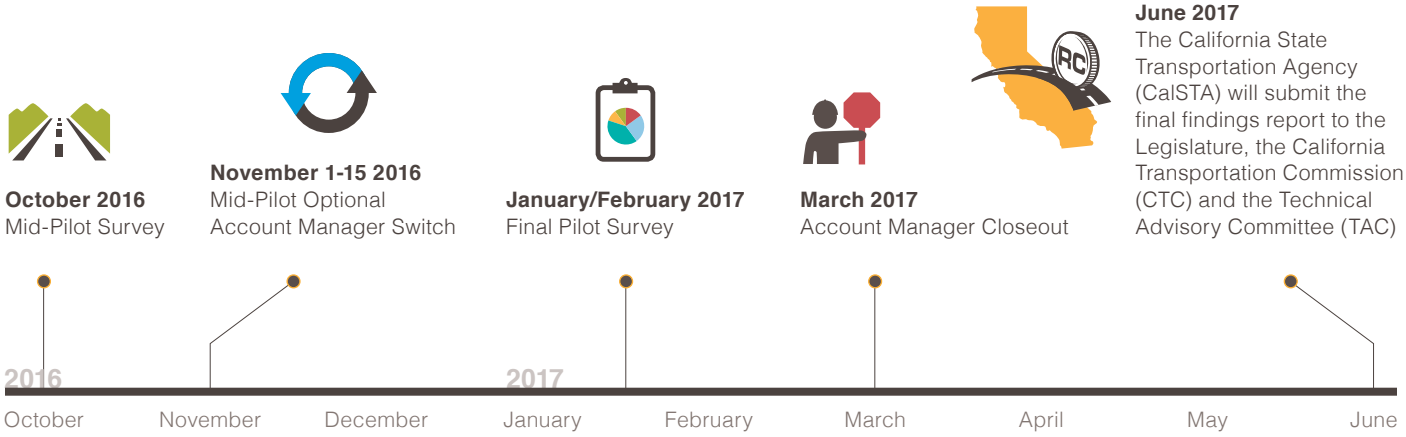


ing America's Surface Transportation (FAST) Act to enhance the current pilot. These grant dollars will help Caltrans engage the public in transportation funding methods and future alternative methods of revenue generation. It will also allow the pilot to improve organizational structure, expand education and outreach, and explore alternative mileage reporting and recording options.

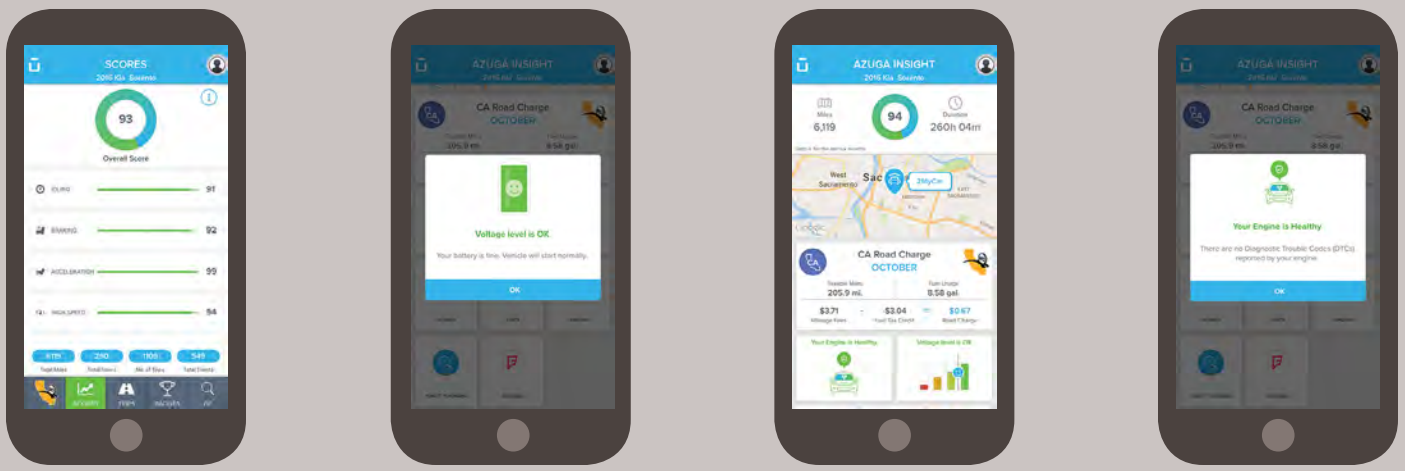
The research and feedback received during the pilot period will be wrapped into a final report that addresses the critical policy issues of data security, privacy, urban and rural drivers, state policies, fleet parity, rate setting, income equity, administrative costs and more. The California State Transportation Agency will submit the final report to the Legislature, California Transportation Commission and the Road Charge Technical Advisory Committee in June 2017 to help guide the Legislature in its decision of whether a road charge funding system is feasible for California. MM

Source: Bridgette Carbajal, Road Charge Pilot Program

Road Charge Pilot Program Timeline



Azuga App



1 *2* *3* *4*

1. View overall driving score based on driving behavior. ***2.*** See how well battery is performing and battery level. ***3.*** Use account dashboard to view all data pertaining to a road charge, including miles traveled, fuel tax credit and wallet summary. ***4.*** View engine health and obtain information about a vehicle when the Check Engine light goes on.

Cleanup Costs Jump

Caltrans Spends Almost Double on Homeless Encampments in 2015-16

Caltrans photos by Steven Hellon

District 3 maintenance crews and a Caltrans garbage truck are ready to clean up a homeless encampment in Sacramento. A typical cleanup process takes days, beginning with a notification posted at the site at least 72 hours prior to its start.

An estimated one-fifth of the nation's homeless population lives in California, mostly in large urban centers, and an increasing number are taking up residence on state highway system right-of-way, putting increased demand on Caltrans' maintenance operations.

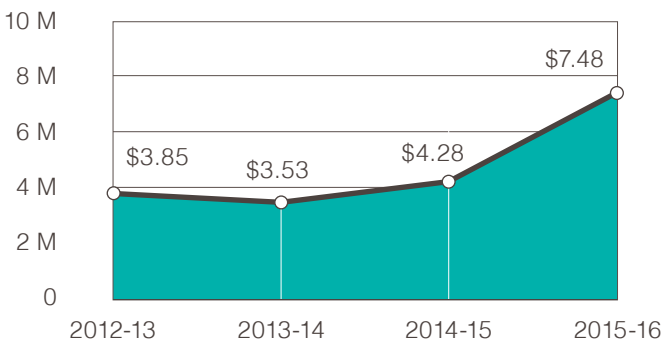
Caltrans spent $7.5 million in fiscal year 2015-16 — twice as much as it did just two years prior — cleaning up after the state's homeless population on its highway right-of-way.

Homelessness is a national problem, but there are unique factors affecting California. In northeastern states like Maine or New York, for example, homeless people tend to stay in shelters, according to a report by the U.S. Department of Housing and Urban Development. But in California, 7 in 10 homeless people fend for themselves on the street or, increasingly, along highways, which has the potential to damage highway infrastructure, create community blight and pose public health and safety risks.

Materials regularly found at the illegal encampments include human waste, spoiled food, animal carcasses, broken glass, toxic chemicals, hypodermic needles and weapons. These items create hazards on the site, and can be carried by stormwater to streams and rivers, posing further environmental threats. Even relatively harmless items such as tents and tarps can present danger if strong winds blow them into the path of motorists.

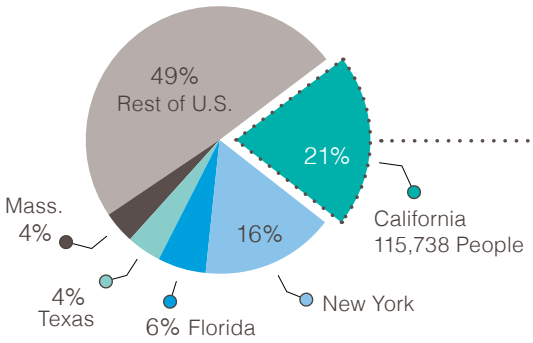
In some cases, inhabitants have tapped into electrical and irrigation lines or have stripped the wiring to sell the copper at scrap yards. This not only causes added expense for Caltrans — and state taxpayers —

Caltrans Homeless Encampment Cleanup Costs on the Rise *(dollars in millions)*

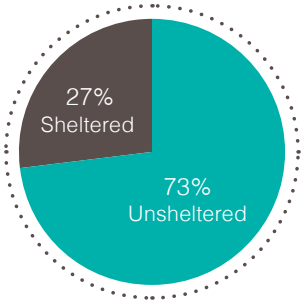


California Leads the Nation in Homeless Population

In January 2015, More Than Half of U.S. Homeless Population Lived in Five States



Almost Three-Fourths of California's Homeless are Unsheltered



States With Highest Rates of Unsheltered Homeless

73%	**California**
71%	Hawaii
58%	Montana
57%	Oregon
54%	Florida-

Source: U.S. Department of Housing and Urban Development Office of Community Planning and Development, November 2015

but also puts motorists at risk if lighting and other highway features go dark because of vandalized utilities.

In addition, illegal encampments often cause extensive damage to the right of way. Fires have been set inside bridge structures to keep inhabitants warm during the winter.

From fiscal year 2012-13 through 2015-16, Caltrans has cleared more than 10,700 illegal encampments at a cost of more than $19 million. In the 2015-16 fiscal year alone, Caltrans participated in 2,531 cleanups.

A typical cleanup takes days, not hours, beginning with a notification posted at the site at least 72 hours prior to its start. Caltrans employees are accompanied by homeless advocates and at least one peace officer as advocates attempt to help the inhabitants find more suitable housing and other necessary services.

On the day of the cleanup, Caltrans workers are escorted by state or local law enforcement as they remove the litter, human waste, and a wide variety of personal items left behind despite the 72-hour notice. Caltrans workers label each item for storage at maintenance facilities for at least 90 days. Unclaimed items are then disposed.

California continues to be refuge to more people without homes than any other state. On a single night in January 2015, according to the HUD report, more than half of the homeless population in the United States was in five states: California (21 percent, or 115,738 people), New York (16 percent, or 88,250 people), Florida (6 percent, or 35,900 people), Texas (4 percent, or 23,678 people), and Massachusetts (4 percent, or 21,135 people).

On a positive note, despite a slight rise in the state's homeless population in 2014-15, the most recent year for which numbers are available, the report says that California has 23,000 fewer homeless people than it did in 2007, representing the nation's biggest drop (16.7 percent) since the start of the Great Recession. MM

***Source:** Caltrans Division of Maintenance*

Materials regularly found at illegal encampments, like this one at left, behind a sound wall in Sacramento, include human waste, spoiled food, animal carcasses, broken glass, toxic chemicals, hypodermic needles and weapons. At right, the same site after cleanup. Cleanups often involve picking up debris, as well as repairing damage to infrastructure.

West Coast Electric Highway Grows

State Adding Charging, Refueling Stations for Zero-Emission Vehicles

Caltrans photos by Thomas Ritter

Twenty hydrogen fuel cell vehicles were recently delivered to the Caltrans District 7 equipment shop in Sylmar. The department now has more than 130 zero-emission vehicles in its fleet.

In 2016, California was home to nearly half of all light-duty zero-emission vehicles in the U.S., with more than 200,000 plug-in electric cars and trucks on its roads, a number Gov. Edmund G. Brown Jr. wants to raise to 1.5 million by 2025.

Caltrans has 3,480 light-duty vehicles, including 133 zero-emission vehicles (64 all-electric vehicles, 49 plug-in hybrids and 20 hydrogen fuel cell cars).

Under the governor's 2016 Zero-Emission Vehicle (ZEV) Action Plan, the department will begin installation of at least 30 public fast-charging locations at highway rest stops and other strategically located Caltrans property. The Caltrans Sustainability Program is developing a pilot program that will first test such stations at two rest areas, two park-and-ride lots and two workplaces.

Caltrans is also working with the California Energy Commission to identify sites for three hydrogen fueling stations on Caltrans right-of-way properties such as rest areas and park-and-ride lots by December 2018.

The 2016 ZEV Action Plan is consistent with Caltrans' Strategic Management Plan 2015-2020 and the California Sustainable Freight Action Plan, and will help expand the refueling network known as the West Coast Electric Highway being built in partnership with Oregon and Washington. Independent of the ZEV Action Plan, Caltrans has approved a total of 175 charging stations throughout the state for its own fleet of zero-emission vehicles.

One goal of the pilot project is to provide a more reliable link for ZEV motorists who might be nervous about their vehicle's ability on the open road to make it from one station to the next before draining their batteries. The pilot also will give the department a chance to measure usage, time spent at fueling stations, as well as possible vandalism and other issues.

The state currently has 28 hydrogen fuel stations (22 retail, six non-retail), with 19 more in development, according to the California Fuel Cell Partnership. Plug-in vehicles have more options, with about 3,500 charging stations (including those only for Teslas) across the state, but most are in urban

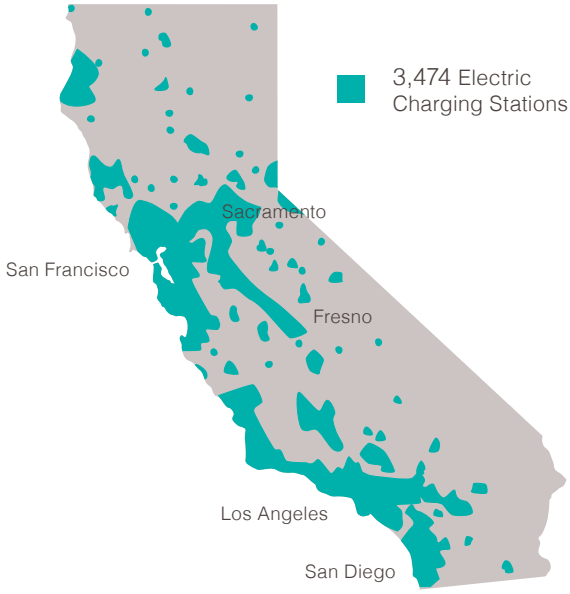
Fuel cell vehicles, like this Toyota Mirai, use hydrogen to produce electricity, generating zero carbon emissions.

This hydrogen fuel station (there are 28 in the state), offers a half-pressure fill (H35, equivalent of a conventional half-tank), and a full fill (H70).

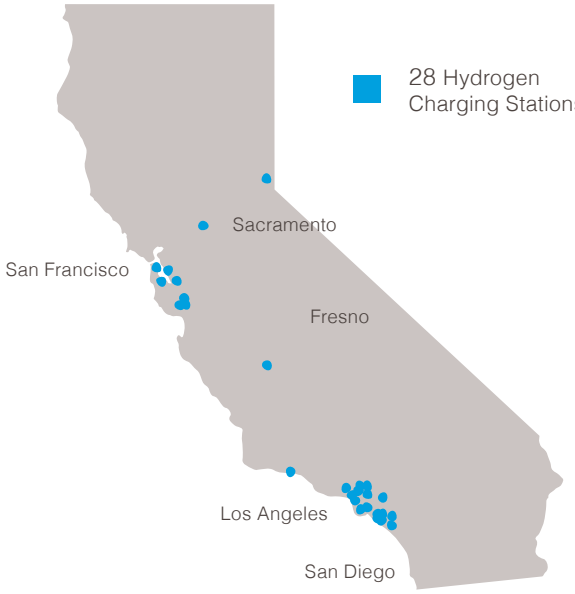
areas, giving motorists some range anxiety out on the open highway.

To some extent, the pilot program and possible addition of even more charging and fueling stations may help foster the fledgling ZEV industry. Private firms, other than Tesla Motors, have been reluctant to build new ZEV fueling stations until consumers buy more vehicles. Meanwhile, consumers are hesitant to buy more ZEVs until more fueling stations are built to permit long-distance trips. These areas are expected to help reduce range anxiety — not to mention reduce the number of stranded motorists — and encourage interregional travel. MM

Electric Charging Stations



Hydrogen Charging Stations



Source: *U.S. Department of Energy*

Electric charging stations, locations shown at left, are heavily concentrated in coastal cities and along the main arteries of the Central Valley. At right, hydrogen fuel stations, while still much less common, appear to be following a similar pattern.

Fish Passages

Caltrans Clears the Way for More Unobstructed Travel

Caltrans completed fish-passage remediations at seven locations in 2015, improving access to habitat for salmon and steelhead trout. A Chinook salmon, above, swims upstream in a Sacramento River tributary in Shasta County.

Caltrans is making it easier for fish to swim in waterways that transect the state highway system.

The department completed fish-passage remediations at seven locations in 2015, improving access to habitat for salmon and steelhead trout, which are listed as threatened or endangered in California. Caltrans demonstrated improvements in all reporting categories: completed remediations, new assessments, active (funded) projects and identification of priority locations

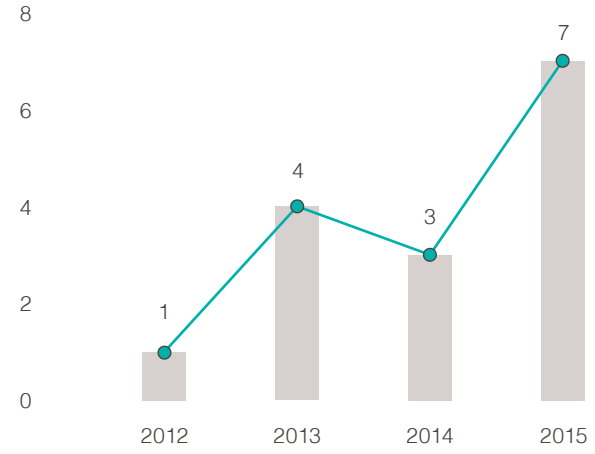
Since 2006, Caltrans has remediated 37 barriers that included the seven in 2015. An additional 37 locations are partially or fully funded, and 50 locations were identified in 2015 as having the highest biological value, but have not yet been funded. Of those 50, Districts 1 (Eureka), 2 (Redding), 4 (Oakland), 5 (San Luis Obispo) and 7 (Los Angeles) each have 10 locations. Passage assessments are ongoing in Districts 3 (Marysville) and 10 (Stockton).

Additionally, 455 fish passage assessments were completed at state highway locations to identify where drainage systems may affect access to fish habitat. Of the 455 assessments, 425 were determined to not be barriers and the remaining 30 locations were found to have either partial or total barriers.

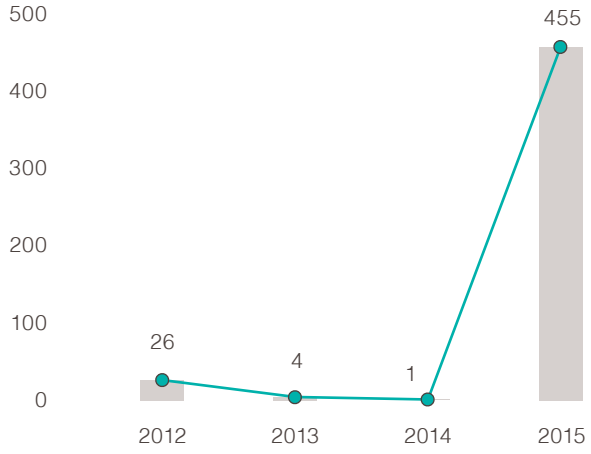
In 2015, Caltrans funded 22 new locations for future remediation, including 18 sites that were determined to be high in biological priority for both Caltrans and the California Department of Fish and Wildlife. Biological priorities are identified due to the presence of endangered or threatened salmon and steelhead, as well as high quality habitat. Four of the future remediation sites were identified as needing routine maintenance or repair.

Remediations often involve replacing culverts — the pipes that carry water beneath roadways — with larger culverts or small bridges, so fish and other wildlife can travel unimpeded through watercourses. This is a priority for Caltrans as part of its mission to make

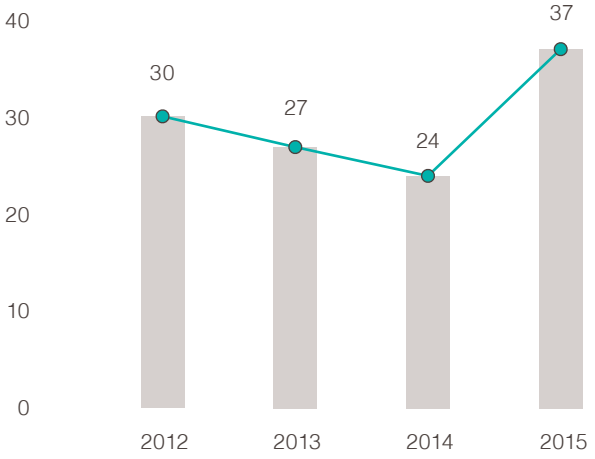
Completed Fish Passage Remediations



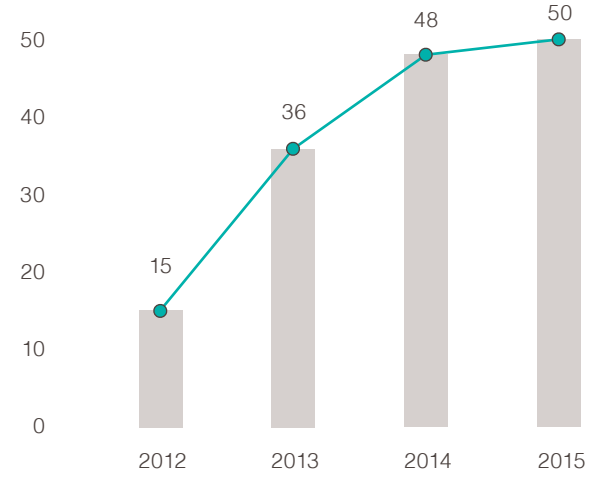
Completed Fish Passage Assessments



Active Fish Passage Remediations



Priority Fish Passage Barriers



"long-lasting, smart mobility decisions that improve the environment (and) support a vibrant economy," as spelled out in the Caltrans Strategic Management Plan. Many of the fish that depend on California's streams and rivers are important to the state's industry, recreation and the natural environment.

Over the past year, Caltrans has worked with partners to find efficiencies, such as standardizing designs for small bridges and employing "accelerated bridge construction," in which precast bridge elements are assembled at the site, reducing construction time and environmental impact.

In September 2016, Caltrans initiated the first-ever meeting of the Bay Area Fish Passage Advisory Committee, bringing together partners from all seven Bay Area counties in District 4 (Oakland). The meeting was well attended by external agency partners and supported by staff and managers in various internal divisions.

The drought has posed additional challenges to the migration of anadromous fish — sea-going fish that breed in fresh water — and the recovery of listed salmonid populations. State and federal partner agencies are working to identify stretches of watershed that are likely to provide cool water during the late summer and early fall to sustain salmonid populations such as southern steelhead and coastal coho, which have been particularly hard-hit by drought. MM

Source: *2015 Fish Passage Annual Report; Senior Fisheries Biologist Melinda Molnar*

Record Redistribution

Feds Reward Caltrans with $293M for Meeting Project Deadlines

Caltrans photo by Scott Lorenzo

Construction has been completed on the Alondra Boulevard Bridge, the largest of three bridges that were built as part of the $110 million Santa Ana Freeway (Interstate 5)/Alondra Boulevard Bridge Project.

California was awarded a record $293 million in extra funding this fall for meeting all of its 2015-16 deadlines for federally funded transportation projects, surpassing its previous record by almost $90 million.

"Caltrans has been rewarded — yet again — for its on-time and responsible use of federal funding, launching new construction projects prior to federal deadlines," Caltrans Director Malcolm Dougherty said in September. "These additional funds will help Caltrans and local transportation agencies to continue to invest in transportation across the state."

The states receive federal funding for transportation projects each year. Any unused money is redistributed to those states that successfully use all of their federal funds and can spend additional money in a very short period of time. This is called the August Redistribution.

This year, that federal pool totaled $2.8 billion — of which California received $293 million, the most in the nation. New York was a distant second with $155.8 million. In fact, California collected more in federal dollars through the August Redistribution than 11 other states did for their entire annual allocation.

Caltrans received roughly $185 million of this extra funding, and local transportation agencies got $108 million. The funding is prioritized for projects that meet the federal deadline of Sept. 27, 2016.

Most of the projects that receive the August Redistribution are already allocated by the California Transportation Commission and are underway using state dollars until federal money becomes available.

Total August Redistribution funds received by California over the last decade exceed $1.5 billion, an amount greater than any other state. Caltrans, on average, passes about 39 percent of those dollars through to local agencies, while most of the rest is used to deliver the department's State Highway Operation Protection Program.

Funding from Other Sources

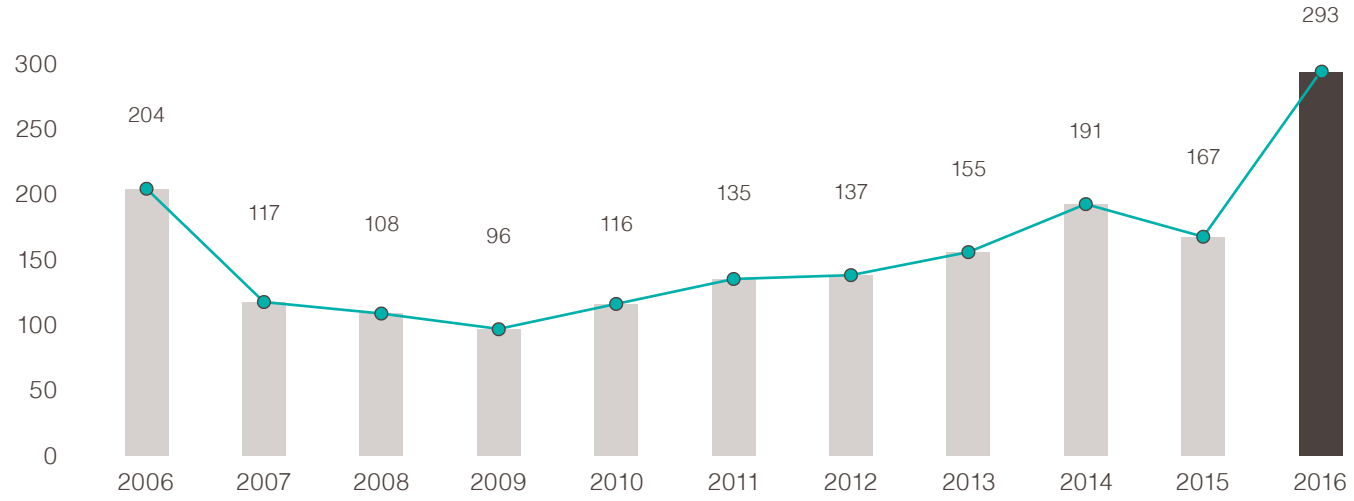
This fall, Caltrans also received an additional $49.3 million in federal money through Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) toward construction of the final segment of a new four-lane highway, State Route 11, to the Otay Mesa East Port of Entry, as well as southbound connectors to other highways.

California also collected $40 million in the eighth round of the highly successful and competitive Transportation Investment Generating Economic Recovery (TIGER) grant program. Grants were given to the following projects:

- $10 million for the Live Oak Streetscape Project (City of Live Oak);
- $8.7 million for the Redlands Passenger Rail Project (County of San Bernardino);
- $15 million for the Rosecrans/Marquardt Grade Separation Project (Los Angeles County Metropolitan Transportation Authority);
- $6.3 million for the Gateway to Oakland Uptown Project (San Francisco Bay Area Rapid Transit District). MM

Source: *Caltrans Division of Budgets*

August Redistribution to California by Year *(in millions of dollars)*



Top 20 States Receiving August Redistribution *(in millions of dollars)*

State	Redistribution	State	Redistribution
California	**$293.1**	Indiana	$72.9
New York	$155.8	Missouri	$72.7
Florida	$150.0	Kentucky	$68.8
Illinois	$133.4	Massachusetts	$65.1
Pennsylvania	$123.4	Minnesota	$65.0
Georgia	$122.2	Arizona	$62.6
Ohio	$120.0	Maryland	$56.3
Michigan	$103.5	Oklahoma	$52.0
Virginia	$90.0	Alabama	$51.4
Texas	$75.0	Colorado	$48.0

Source: U.S. Department of Transportation Federal Highway Administration

A single plan

Redefining the way projects are selected

The 2017 State Highway System Maintenance Plan (SHSMP) represents a significant departure in the way Caltrans lays out its plans to care for the existing transportation system for the decade ahead. It pulls together for the first time the 10-year State Highway Operation Protection Plan and Five-year Maintenance Plan, creating an integrated document that is expected to be the first in the nation to meet federal performance-management regulations.

When the SHSMP is released in late January 2017, it will represent a notable shift in Caltrans planning — from a program-by-program approach to a system-wide method. And it will clearly link maintenance and rehabilitation projects with strategic objectives.

The plan is intended to illustrate how individual projects help meet specific goals in the department's Strategic Management Plan. It likewise gives more details about the precise needs and investments in each of the strategic areas.

Caltrans is required by state law to update its maintenance and rehabilitation plans every two years. The SHSMP fulfills that requirement and satisfies many of the standards set by the Moving Ahead for Progress in the 21st Century Act (MAP-21), which requires departments of transportation in all 50 states to implement a comprehensive transportation asset management plan.


Caltrans photos by Steven Hellon

These new measures change the way existing conditions are reported. For example, measuring bridge health in square-foot increments rather than by entire structures will help decision makers compare the benefits of proposed bridge rehabilitation projects.

When the SHSMP is released in late January 2017, it will represent a notable shift in Caltrans planning — from a program-by-program approach to a system-wide method.

The needs assessment portion of the plan will explain what it would take to meet specific performance targets in each of the transportation system's 34 objective areas.

Caltrans is expected to present the SHSMP to the California Transportation Commission (CTC) in January 2017. The final plan will go into effect July 1.

California, like many states, has no plans for major system expansion. Instead, it is increasingly focused on the kind of repairs and upgrades that will maximize safety conditions and efficiency of the existing system.

Caltrans applies this fix-it-first approach to the operation and maintenance of 50,000 state highway lane-miles, more than 13,000 bridges and more than 200,000 drainage structures.

It is critical to use rehabilitation dollars on projects that provide the best benefit, because the costs of repairing the system far exceed the funds available to do so. The SHSMP is designed to stem deterioration of the state highway system and avoid closures and more expensive repairs in the future.

Good/Fair/Poor

The CTC in October approved performance goals based on the "good-fair-poor" rating system on the state's four biggest asset classifications. The SHSMP will use the new rating system to determine what it would cost to close the gap between current conditions and established goals.

For example, reaching performance targets for bridges would take about $550 million a year, an increase of about $155 million. The same kind of gap between needs and resources exists for virtually every class of assets on the transportation system.

The CTC adopted the good-fair-poor system to conform to requirements of the MAP-21 and the Fixing America's Surface Transportation Act (FAST Act), which require the development of a transportation asset management plan with national performance measures for pavement and bridges. Caltrans had previously begun measuring its culverts and Intelligent Transportation Systems (ITS) using a similar good/fair/poor rating system.

Examples of Targets and Current Conditions for Asset Classes

Asset Class	Units	Good		Fair		Poor	
		Current	Target	Current	Target	Current	Target
Culverts	Length	65%	80%	23.5%	10%	11.5%	10%
ITS Elements	Each	64.5%	90%	Not Applicable		35.5%	10%

These are the current conditions and targets for bridges and culverts. Similar performance goals will be set for pavement and bridges, beginning in 2017.

Transportation departments in all 50 states have until April 2018 to adopt the new ratings for bridges and pavement, so it will be possible to know exactly how well those assets in California compare with those in the other states.

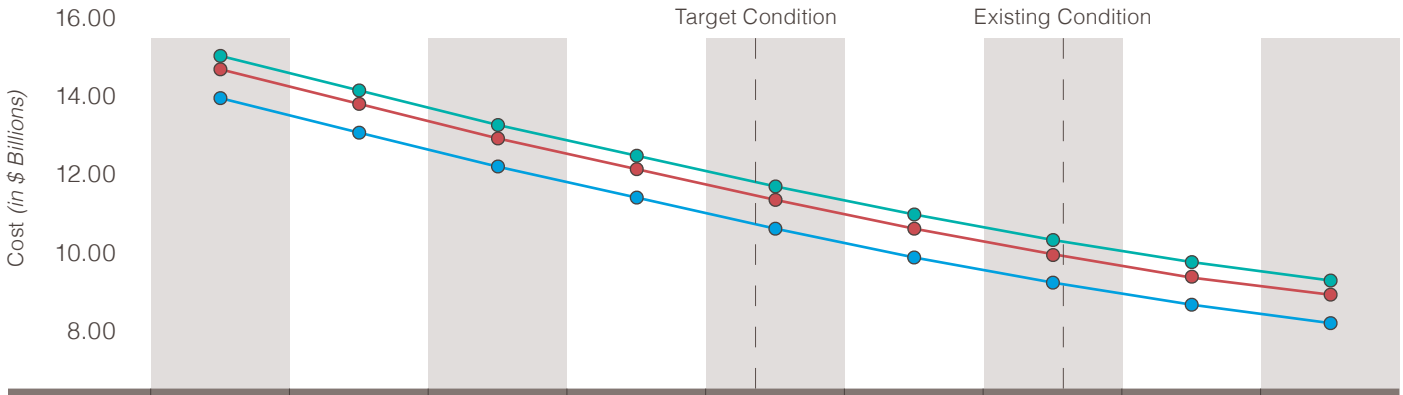
These new measures and targets differ from all prior SHOPP plans and are not directly comparable. The federal government is scheduled to release the specific technical guidelines for the new rating system in December 2016.

It is important to note, too, that a "poor" rating in any of the asset classes does not mean "unsafe." Any Caltrans asset found to be unsafe would be immediately closed and repaired.

The targets attempt to strike a balance between cost and performance analysis, recognizing, for example, the practical realities that make achieving a zero-percent "poor" condition impossible. At the same time, the goal is to move much more of Caltrans assets from "poor" and "fair" into a "good" rating.

Of course, there's a cost associated with that goal, which is most easily explained by taking a closer look at pavement preservation and rehabilitation, which represents the single largest asset class investment in the SHOPP. More than half of state-managed pavement is considered Class 1, which is made up of 26,000 miles of interstates, principal arterials and urban freeways and expressways. Like

Pavement — Class 1: Performance-Cost Curve



Fair Target	20	25	30	35	40	45	50	55	60
Poor 1%	15.62	14.75	13.88	13.09	12.30	11.58	10.93	10.37	9.90
Poor 2%	15.27	14.39	13.52	12.73	11.94	11.22	10.57	10.01	9.54
Poor 4%	14.54	13.66	12.80	12.01	11.22	10.49	9.85	9.29	8.82

This chart illustrates how improving Class 1 pavement (used on interstates, other principal arterials and urban freeways and expressways) from 4 percent "poor," which is the current condition, to 1 percent (goal), will cost the state billions of dollars over a decade.

Estimated SHOPP Funds Needed to Achieve Recommended Unconstrained Targets

Asset Class	Proposed 2017 Ten Year Plan (Annual Estimates)	2015 Ten Year Plan (Annual Estimates)
Pavement	$1.86 Billion	$2.0 Billion
Bridges	$0.55 Billion	$0.40 Billion
Culverts	$0.26 Billion	$0.49 Billion
ITS Elements	$0.19 Billion	$0.19 Billion
Total	**$2.86 Billion**	**$3.09 Billion**

This table summarizes the estimated SHOPP funds that will be needed to achieve the recommended unconstrained targets.

all other asset classes, the "poor" targets are set very low to minimize risk and improve the ride quality. The fair target for all assets consider life-cycle cost, unit cost, deterioration rates and typical project delivery time periods.

As seen in the chart illustrating the 10-year plan for such pavement (page 23), improving Class 1 pavement from 4 percent "poor," which is the current condition, to 1 percent (goal), will cost the state billions of dollars over a decade.

Not all asset classes will be similarly affected. Costs are expected to drop from the 2015 plan to achieve the targets set for culverts, for example. This change is being influenced by a more complete inventory (see story, page 16) and by changing performance units from a simple count to linear feet and changes in the "fair" condition target.

Other similar variations are expected in all Caltrans assets as the department reaches full implementation of its asset management plan by 2020. MM

Source: *State Transportation Asset Management Engineer Michael B. Johnson*

Pavement: Examples of Good, Fair, Poor

Following the new MAP-21 federal guidelines, pavement condition is rated using specific technical criteria to measure roughness, cracking, rutting and faulting.

Bridges: Examples of Good, Fair, Poor

Following the new MAP-21 federal guidelines, bridge condition is rated using specific technical criteria for the deck, superstructure, substructure and culverts. Three Northern California bridges were chosen to illustrate "good," "fair" and "poor," although from a distance the reasons for the ratings are difficult to detect. These bridges are, from left, the Miner Slough bridge over the Sacramento River on State Route 84 in Solano County; the Capell Creek Bridge in Napa County; and the Benicia Viaduct 23-0143L, in the North Bay.

New Laws Lineup

Bills Focus on Transportation Issues

Caltrans photo by Steven Hellon

On New Year's Day, hundreds of bills passed during the 2015-16 legislative session that will become law. Here are some of the more important pieces of legislation affecting transportation that will take effect Jan. 1, 2017.

AB 1549 *(Wood) – Rural Broadband*

This bill requires Caltrans, via its website, to notify broadband companies of projects Caltrans is planning that could be suitable for installing conduits to house fiber optic cables. In addition, the bill directs Caltrans to develop guidelines to facilitate access to information on existing facilities and collaboration on future projects.

AB 1613 *(Committee on Budget) – Budget Act of 2016*

This bill continues the support of the Transit and Intercity Rail Capital Program through the Greenhouse Gas Reduction Fund (cap and trade) with an appropriation of $135 million from the Fund, and adds the Active Transportation Program as a recipient of cap and trade funds with an appropriation of $10 million (see story, page 35). Both appropriations are for the 2016-17 fiscal year.

AB 2087 *(Levine) – Regional conservation strategies*

This bill establishes a pilot program for the Department of Fish and Wildlife to provide environmental mitigation credits for eight regional conservation investment strategies to public agencies for environmental conservation and rehabilitation work for future projects, subject to certain conditions relating to regional conservation plans, until Jan. 1, 2020.

AB 2126 *(Mullin) – Construction Manager/General Contractor (CMGC) projects*

This bill doubles, from six to 12, the number of projects where Caltrans may use the Construction Manager/General Contractor contracting method. This method is intended to reduce project costs by incorporating contractor input and ideas during the design phase of a project, which minimizes delays during construction.

AB 2289 *(Gatto) – SHOPP*

The repair and rehabilitation of existing state highways is funded through the State Highway Operation and Protection Program (SHOPP). This bill clarifies that this funding may be used for projects that enhance the operation of current state highways.

AB 2542 *(Gatto) – Reversible lanes*

This bill requires any state or local automobile capacity increasing project or highway realignment project approved by the California Transportation Commission to have considered reversible lanes in the design of the project.

AB 2620 *(Dababneh) – Prop 116 funds reallocation*

The Clean Air and Transportation Improvement Act of 1990 (Proposition 116) provided bond funds for certain, specified passenger rail projects, with the provision the Legislature could reallocate funds ultimately not used for the projects. This bill authorizes the California Transportation Commission to reallocate those unexpended funds to existing passenger rail services consistent with Proposition 116's intent and criteria.

AB 2800 *(Quirk) – Climate change and infrastructure*

This bill requires state agencies to consider expected climate change impacts when planning and designing state infrastructure projects. It creates a cross-department working group to provide recommendations to the Legislature on integrating scientific climate change data into the design of infrastructure projects by July 1, 2018.

SB 438 *(Hill) – Earthquake early warning system*

This bill creates the California Earthquake Early Warning Advisory Board (Board) within the California Office of Emergency Services (Cal OES) to support the development of the statewide earthquake early warning system. As transportation infrastructure is critical infrastructure, a representative of the Transportation Agency is part of this Board.

SB 824 *(Beall) – Low Carbon Transit Operations Program revisions*

This bill gives local transit operators added flexibility in their use of Low Carbon Transit Operations Program funds. Operators will be allowed to commit funds for projects beyond a single funding cycle, loan funds to or share funds with other local transit operators, and expand the types of projects eligible to receive Program funds.

SB 838 *(Budget & Fiscal Review) – HOV/HOT lane green stickers*

This bill removes the existing cap of 85,000 on the number of DMV issued green decals exempting plug in hybrid vehicles from occupancy requirements on carpool lanes, and provides discounts on state owned high occupancy toll lanes and state owned Bay Area toll bridges through the expiration of the program on Jan. 1, 2019. This bill also requires Caltrans to submit a report to the Legislature on the performance of the state's carpool and high-occupancy toll lanes by Dec. 1, 2017.

‘Raise 80’ Boosts Safety, Commerce

Higher Clearances for Placer Overcrossings Benefit Communities, Shippers

No longer will truckers that transport oversized loads over the Sierra Nevada on Interstate 80 have to worry about striking a low overcrossing, or being forced onto side roads or long detours.

Nine I-80 overcrossings in south Placer County have been elevated to accommodate larger trucks under the Caltrans Vertical Clearance project, dubbed “Raise 80.” The federally funded, $36 million project increased the vertical clearance of those nine older overcrossings (including one railroad trestle) to the new overcrossing height requirement of 16 feet, 6 inches. Seven of the overcrossings were raised between 16 and 21.5 inches, while the roadways underneath two overcrossings — one a Union Pacific railroad trestle — were excavated an average of 18 inches each to achieve the required clearance.

The overcrossings were built in the late 1950s when trucks transporting goods were much smaller.

As America’s economy has grown, so have the trucks — getting longer and taller. As more big rigs are unable to fit under these older overcrossings, the potential for “high load hits” has increased, although the exact number of incidents is unknown.

On the Placer County portion of I-80, large trucks were avoiding the low bridges by using local roads ill-equipped to handle their tall loads. The other option for truckers was to use a 300-mile detour.

Not anymore.

Contractor RGW Construction of Livermore was awarded the project contract in April 2014. Together with engineers from the Caltrans Office of Structure Construction, and North Region Construction, the project’s schedule was established and the intricate process to lift a bridge structure was developed.

The overcrossings provide essential routes to and from home, school and work for thousands of local residents. As each of the seven bridges closed for lifting, detours had to be established and publicized. Closure of I-80 during the nights when the actual lifts were done meant truckers, commuters, tourists, residents, local businesses and community groups needed to be informed. With more than 170,000 vehicles traveling I-80 every day, (carrying an estimated $4.7 million of goods every hour), effectively coordinating with local, regional and intrastate entities, as well as media, to get the word out was essential.

While the “Raise80.com” campaign generated

much interest in project schedules and closures, others were fascinated by the engineering feat of raising bridge structures weighing millions of pounds.

Before lifting an overcrossing, workers placed concrete barricades around the bridge columns on the freeway to provide space for construction. The overcrossing was closed to traffic, and steel-frame temporary supports were constructed under the bridge structure to hold it in place. Underneath these supports were hydraulic jacks capable of lifting, inch-by-inch, the immense weight of each concrete bridge structure. (The overcrossings themselves weigh from 1.88 million to 3.88 million pounds.) These temporary supports bore the bridge's weight while approximately 2.5 vertical feet of concrete on each column was chiseled away to expose the rebar. Once the rebar was cut, the bridge was supported by the temporary supports and the bearing pads upon which each end of the bridge rested.

Up on top, the pavement connecting the roadway to the bridge was cut to free the structure for lifting. Under each bridge end (abutment), lumber was brought in for temporary support while additional hydraulic jacks were spaced across each end as the last component of the "lifting" equipment. The overcrossing was then ready to be raised.

After closing the freeway, the jacks were pressurized, and as RGW's project superintendent counted down, each jack began edging upward. With workers at each column (some overcrossings had nine columns) calling out the quarter-of-an-inch increases (done to ensure all columns were being raised at the same speed to prevent structure cracking), the structure was lifted several inches and halted. Then the jacks under the abutments were pressurized, and the crews called out the precise vertical increases until each was level with the new column height. Back and forth the lifts continued until the 16-foot, 6-inch height was achieved.

Raising an Overcrossing

Once supports are in place, the concrete of the bridge columns is chiseled away to expose the steel rebar.

Hydraulic jacks, capable of lifting four to six inches, raise the steel frame that supports the bridge deck. Wood/steel plates support each new height level.

Bridge column reinforcement bars (rebar) are now separated by 16 to 21.5 inches. Steel couplers are used to reconnect the rebar inside each bridge column.

Concrete is poured into wood forms to create a new, taller bridge column.

Raise 80 Projects Completed

Overcrossing	Date Completed	Lift Height
Magra	September 2014	1 foot, 4 inches
Penryn Road	November 2014	1 foot, 6 inches
Brace Road	January 2015	1 foot, 9 inches
Gilardi Road	March 2015	1 foot, 6 inches
Horseshoe Bar Road	April 2015	1 foot, 6 inches
King Road	June 2015	1 foot, 6 inches
Newcastle Road	March 2016	1 foot, 6.5 inches
Underpass	**Date Completed**	**Excavation Depth**
Weimar Cross Road	May 2015	average 18 inches*
Newcastle Union Pacific Railroad	May 2016	average 18 inches*

** Excavation across three lanes of curved freeway varied in depth*

It was an exciting process to watch. The energy and focus of the contractor's crew and Caltrans engineers and inspectors was palpable, and a sudden shout to stop (usually because a single jack had stopped lifting) brought an additional dimension of drama. Viewers marveled at the precise engineering and intricate choreography of the operation.

The next step involved reattaching the bridge to the existing foundation. Steel couplers were used to splice the rebar together, and concrete was poured into forms around each column to solidify the bridge's foundation. The roadway on both ends of the bridge was reconstructed to match the new bridge height. Finish work on the bridge included new railings, facing and sidewalks; pedestrian and bicycle barrier fencing; and new drainage, erosion control measures, and drought-resistant landscaping. Finally, the overcrossings received new pavement and striping.

The two remaining overcrossings presented different challenges. Because Weimar Cross Road met height requirements over westbound I-80, but not on the eastbound side, engineers decided to excavate and lower the eastbound lanes about 18 inches. The excavation operation ended up saving time and money.

The remaining overcrossing, the Newcastle Union Pacific Railroad trestle, also couldn't be lifted. To achieve the desired height, excavation was required on both sides of the freeway. The result was a barely noticeable, gradual slope that lowered the roadway as much as 18 inches to allow trucks unobstructed passage.

In the town of Loomis, along I-80, Loomis Chamber of Commerce members, town officials, Caltrans staff and neighbors held a ribbon cutting for the town's new Western-themed artwork on the Horseshoe Bar Road crossing.

Other overcrossings in Caltrans' District 3 also have been elevated. In the summer of 2016, three overcrossings on Interstate 5 near Orland were also raised to conform to the new height requirement. These projects, and the Raise 80 endeavor, provided valuable knowledge and experience for other transportation engineers seeking to bring their overcrossings into compliance with state and federal highway standards for interstate freeways.

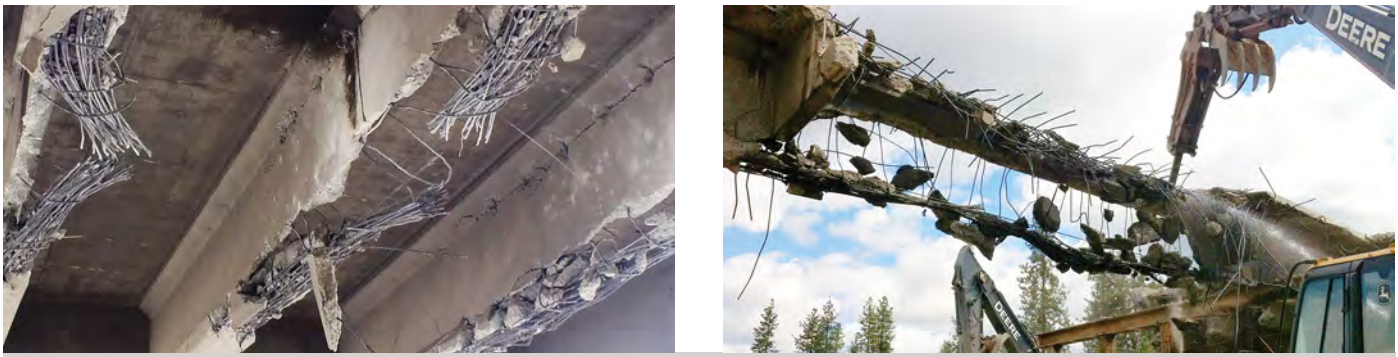
At the ribbon cutting ceremony in July 2016, Caltrans Director Malcolm Dougherty said the Raise 80 vertical clearance project is a "clear demonstration of the commitment of the State of California and Caltrans to support our state's, and our nation's, economy by efficiently moving goods and people."

And by eliminating the need for truckers to use local roadways as detours, Placer County's Economic Development Board Chair Dave Butler said that the project was a "positive contribution to the region's quality of life."

The project offered many opportunities for partnership with local agencies and organizations. Town of Loomis Mayor Brian Baker was especially thankful for Caltrans' partnership and assistance to install artwork celebrating their town onto the project's Horseshoe Bar Road overcrossing. MM

***Source:** Liza Whitmore, District 3 Public Information Officer*

High Loads Pose Big Danger



The Walters Road overpass on Interstate 5 south of Yreka sustained massive damage in 2012 after being struck by a high load. At right, the overpass is being removed prior to replacement.

Low bridges pose a transit challenge in the state. Of the 13,100-plus bridges that Caltrans maintains, more than 1,000 are classified as poor for vertical clearance — meaning the structure does not provide 14 feet of clearance for non-principal arterial local roadways under state facilities, 15 feet for state conventional highways, and 15 feet, 6 inches for state or local principal arterials.

There are almost 800 bridges classified as fair for vertical clearance, providing at least 15 feet of space for non-principal arterial local roadways under state facilities and conventional highways, and at least 16 feet for state and local principal arterials.

The remaining bridges in California, more than 11,300, are listed as good for vertical clearance, maintaining at least 15 feet of space for non-principal arterial local roadways under state facilities and state highways, and 16 feet for state or local principal arterials.

According to Caltrans' Highway Design Manual, the minimum vertical clearance on all new construction, lane additions, reconstruction or modifications performed on freeways and expressways is 16 feet, 6 inches. A height notice must be posted on any state highway overpass with a vertical clearance below 15 feet, 6 inches.

Companies that ship loads taller than 14 feet on state roads must obtain permits from Caltrans prior to their trips. Of the almost 113,000 single-trip permits issued by Caltrans in fiscal year 2015-16 for oversized vehicle trips, about 79,000 permits, or 70 percent, were for vehicles that exceeded the 14-foot height limit specified in the California Vehicle Code.

Cleaner Locomotive Fleet Powers Up

22 New Units Ordered for State-Supported Amtrak Corridors

Caltrans photos by Scott Lorenzo

This is one of 22 Charger diesel-electric passenger locomotives ordered by Caltrans and being built by Siemens Mobility in Sacramento. The Chargers are the first locomotives to comply with new federal emissions standards, producing 85 percent fewer emissions than existing engines serving California's Amtrak corridors.

Caltrans has ordered 22 higher-speed diesel-electric passenger locomotives that will be among the first in the nation to meet strict new federal emissions guidelines.

The first six of those Charger locomotives, built by Siemens Mobility in Sacramento, are expected to be released from the factory in early December and will undergo testing and commissioning prior to being put into daily service this spring.

The Chargers will replace part of California's aging Amtrak fleet and are expected to improve reliability, reduce greenhouse gas emissions and help efforts to double current ridership of 5.4 million passengers by 2040.

California's 16 remaining Chargers are expected to start coming off the assembly line in 2018. Each locomotive costs about $5.9 million.

In 2012, Caltrans joined its Department of Transportation counterparts in Illinois, Michigan, Missouri and Washington to purchase locomotives for corridor service operated by Amtrak. Caltrans' joint procurement of these locomotives has helped to establish a national emissions standard, and maximized the state's purchase power of the funds provided through the American Recovery and Reinvestment Act and High-Speed Intercity Passenger Rail Investment grants.

The Chargers themselves are powered by 4,400 horsepower-rated diesel engines and are the first to comply with the U.S. Environmental Protection Agency's strict Tier 4 emissions standards, which reduce emissions by approximately 85 percent, compared with most existing locomotives in service on the Pacific Surfliner corridor from San Diego to San

Luis Obispo County. Much of the emission reduction is achieved through an exhaust after-treatment system that converts toxic nitrogen oxide (NOx) emissions into a harmless dinitrogen gas and water. The locomotives are rated to safely reach speeds up to 125 mph.

On normal weekdays, statewide service across the three state-supported corridors (Capitol, San Joaquin, Surfliner) requires 26 locomotives, but maintenance, periodic unscheduled repairs and inspection cycles for locomotives often strains the existing capacity for the Caltrans and Amtrak fleet's ability to meet daily service demands. By procuring additional locomotives, the state will be able to provide the current level of service without interruption.

The Chargers, with Cummins QSK95 diesel engines installed, also boast new safety technology throughout, and a diagnostics system that provides messages on the engineer's display panel that distinguish between minor and severe faults to determine whether the train needs to stop immediately or can continue safely until its next scheduled maintenance. MM

***Source:** Caltrans Division of Rail and Mass Transportation, Siemens Mobility*

Siemens SC-44 Charger			
Power type	Diesel-electric	Fuel type	Diesel
Builder	Siemens Mobility	Fuel Capacity	1,800 U.S. gallons
Length	71 feet, 5 inches	Aspiration	Turbocharged
Width	10 feet	Cylinders	16
Height	12 feet, 6 inches (roof); 14 feet, 4 inches (roof shroud)	Brakes	Dynamic/regenerative/electropneumatic
Axle Load	67,500 pounds	Maximum speed	125 mph
Locomotive weight	264,556 pounds	Power output (at alternator)	4,400 hp

***Source:** Siemens Mobility*

A Siemens employee works on a Charger display panel equipped with a diagnostics system designed to show the severity of faults detected within the locomotive.

The front of this locomotive is closer to completion as lights and electrical hookups are added.

Funding to Fix Culverts Falls Short

While Many in Good Condition, Others Need Major, Expensive Rehab

Culverts are a vital part of California's transportation system because they prevent flooding and erosion by channeling streams and storm water beneath roads and highways.

In 2015-16, Caltrans crews inspected 8,938 culverts and found the majority, 68 percent, were in good condition and required no repairs. Another 20 percent needed only corrective maintenance or minor repair. But 10 percent required major rehabilitation, and 2 percent are in such bad shape they can no longer do the job for which they were built.

That categorical breakdown for the last fiscal year is similar to what inspectors have found over the past 10 years, and is likely predictive of what they will find as they continue to systematically catalogue and assess the remaining inventory of culverts. There are an estimated 205,000 culverts in the state highway system. Of the 114,693 culverts assessed to this point, 62 percent are in good condition; 25 percent are rated in fair condition, and 13 percent are in poor condition.

Based on information gathered so far, Caltrans estimates it will cost approximately $570 million annually over a 10-year period to assure that 90 percent of the culverts are in good or fair condition. That money will need to come from the State Highway Operation and Protection Program (SHOPP), the main funding source for Caltrans' maintenance needs.

The most recent four-year SHOPP allocated about $60 million a year to repair and replace failing culverts.

Corrective and routine maintenance work is funded by the State Highway Account (SHA), currently at $5 million per year plus support costs. For 2016-17, the SHA allocation for drainage has been doubled to $10 million.

Failed culverts can cause traffic delays, require costly repairs and interrupt the transportation system. Culvert failures can also damage the surrounding riparian environment. Debris and sediment from a culvert failure can clog streams and creeks and impede migrating fish.

These culverts are part of the newly constructed Willits Bypass on U.S. Highway 101.

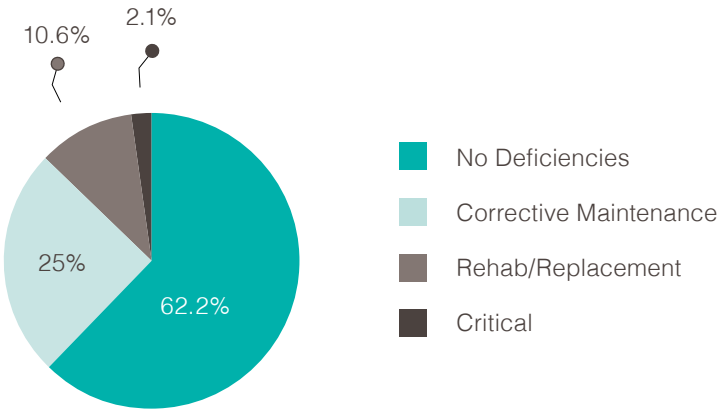
Culverts fail over time for various reasons, such as usage, age and environmental conditions. Some common causes for culvert failures are clogs, pipe damage, washouts, rusted or failed inverts, cracked concrete, exposed or corroded reinforcing steel, joint separation and backfill infiltration. Culvert failures can be a hazard to the traveling public.

Most of Caltrans' 12 districts each have a goal of 1,200 inspections annually (about 23 each week per district). But districts in the most urbanized areas, such as the San Francisco Bay Area, Los Angeles and Orange County, set lower annual inspection goals of 800 per year because of the difficulties of assessing culverts due to traffic volume and limited lane closure options.

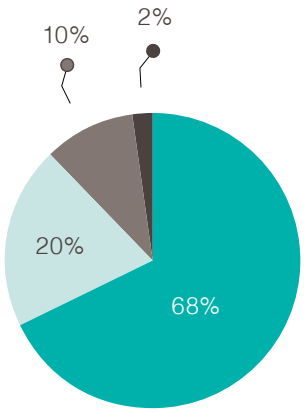
Districts 7 and 8 (Los Angeles and San Bernardino, respectively) met or exceeded their goals for fiscal year 2015/16. Districts 7 and 11 (Los Angeles and San Diego) are adding additional inspection crews to expedite the culvert inventory review.

Of the culverts inspected since fiscal year 2005, about 62 percent are in good working order, about 25 percent are in fair condition needing corrective

Conditions of all Culverts Assessed since 2005



Conditions of Culverts Assessed in 2015-16



or preventative work, and about 13 percent are in poor condition, requiring either major rehabilitation or replacement.

Of the 8,938 culverts assessed in 2015-16, 68 percent (6,088) had no deficiencies (good category), 20 percent (1,776) are in need of corrective maintenance (fair category), with 10 percent (875) in need of major rehabilitation and 2 percent (199) rated in critical condition (poor category). MM

Source: *Division of Maintenance Culvert Inspection Program End of the Year Report FY 2015/16; Parviz Lashai, Chief of Roadside Maintenance*

Culvert Inspections Report 2000-2016

No Deficiencies	Corrective Maintenance	Rehab/Replacement	Critical
71,331	28,718	12,197	2,447
62.2%	25.0%	10.6%	2.1%
Length (ft.): 6,824,926	Length (ft.): 2,685,942	Length (ft.): 1,095,988	Length (ft.): 217,005
Like new condition. No maintenance needed.	Culverts in this category fall under Minor Maintenance and HM2-251 Programs. Maintenance activity includes lining of culverts, clearing of debris and filling in of spalls.	Culverts in this category generally fall under SHOPP Programs and Director's Orders. Some culverts in this category are candidates for lining, but most will probably need major rehab or replacement.	Culverts in this condition have failed and are not functioning as designed.

New Paths for Active Transportation

$10 Million Comes from Cap-and-Trade Program

Caltrans photo by Steven Hellon

Cyclists follow a bike path on Capitol Mall in Sacramento that goes from solid green to broken to mark a right-turn lane. California's Active Transportation Program has expanded cycling and pedestrian options in the state.

A fund to help California reduce its greenhouse gas emissions is providing the California Transportation Commission (CTC) with an additional $10 million for its Active Transportation Program, allowing work on many more bicycle and pedestrian projects throughout the state to begin years ahead of schedule.

The Active Transportation Program (ATP) was created by the Legislature to encourage motorists to find more "active" modes of transportation — namely biking and walking — by providing passages such as bike paths, crosswalks and sidewalks, for example. Each year, cities, counties and regional transportation agencies throughout California ask the CTC to help fund such projects.

In May, the CTC approved the 2017 ATP Fund Estimate, which projected $122.78 million for ATP projects in fiscal years 2019-20 and 2020-21. The CTC received more than 450 applications requesting projects valued at nearly $1 billion. Funding for building some of those projects was made possible in September when Gov. Edmund G. Brown Jr. signed Assembly Bill (AB) 1613, which included a one-time appropriation of $10 million from the Greenhouse Gas Reduction Fund — which itself is funded from the state's Cap-and-Trade Program.

The CTC adopted guidelines in October to allocate these funds by June 30, 2018.

The ATP also received an additional $8 million in federal funding from the Fixing America's Surface Transportation (FAST) Act. That money, also awarded after the 2017 ATP fund estimate was initially approved, will be distributed over three fiscal years, from 2016-17 through 2018-19.

Revised ATP Fund Estimate					
2016-17	2017-18	2018-19	2019-20	2020-21	Total
$131,506,000	$122,780,000	$122,780,000	$122,780,000	$122,780,000	$622,625,000

The 2017 five-year fund estimate for the Active Transportation Program has been revised to reflect the $10 million received from the Greenhouse Gas Reduction Fund, a one-time increase. The fund estimate was further revised — after the 2017 fund estimate was completed — to account for $8 million received this year from the FAST Act. Those funds were assigned to 2020 allocations.

Project sponsors wishing to tap into the additional money provided by the Greenhouse Gas Reduction Fund were asked to submit more information — including using a formula developed by the California Air Resources Board (CARB) — to quantify how much their project will reduce greenhouse gas emissions. That figure will help determine the projects selected for early funding.

The Greenhouse Gas Reduction Fund is guided by AB 1532, which establishes goals for the investment of auction proceeds, and AB 535, which requires that funds benefit disadvantaged communities.

The fund's goals are to:

- reduce greenhouse gas emissions;
- maximize economic, environmental, and public health benefits to the state;
- foster job creation by promoting in-state greenhouse gas emission reduction projects carried out by California workers and businesses;
- complement efforts to improve air quality;
- direct investment toward the most disadvantaged communities and households in the state;
- provide opportunities for businesses, public agencies, nonprofits, and other community institutions to participate in and benefit from statewide efforts to reduce greenhouse gas emissions; and
- lessen the impacts and effects of climate change on the state's communities, economy and environment.

The bicycle and pedestrian projects funded by the ATP not only encourage increased use of active modes of transportation, they support sustainable communities and healthier, low-carbon travel choices — ensuring that disadvantaged communities fully share in the program's benefits. The ATP also strives to enhance public health, in part by reducing childhood obesity through projects eligible for Safe Routes to Schools Program funding. MM

Source: *California Transportation Commission Deputy Director Mitchell Weiss, Associate Deputy Director Laurie Waters*

A concrete-and-steel barrier separates vehicular traffic from cyclists on this Class 1 bicycle path over Highway 50 in Sacramento. The bicycle and pedestrian projects funded by the Active Transportation Program not only encourage increased use of active modes, they support sustainable communities and healthier, low-carbon travel choices.

Project Delivery Process Tested

Construction Manager/General Manager Pilot Shows Progress

Nearly 600 controlled charges were used to implode one of the foundations of the old Bay Bridge in 2015. The contract for the demolition project was reached using the Construction Manager/General Contractor Pilot Program.

A pilot program to bring a contractor into the project delivery process much earlier than the traditional method for certain projects is showing early promise, according to a Caltrans report on the Construction Manager/General Contractor (CMGC) Pilot Program submitted in November to the Legislature.

The CMGC Pilot Program, established by AB 2498, allowed Caltrans to use this trial procurement method for up to six projects beginning in January 2013. The law required at least five of the six projects to have a construction cost of more than $10 million.

The CMGC program is an alternative to the traditional design-bid-build process for highway improvement construction. Under design-bid-build, construction on any part of a project cannot begin until an agency develops complete plans and specifications for the entire project, places the contract out for bid, and awards the contract. The general contractor chosen has no involvement during a project's development.

Through the CMGC program, Caltrans hires a construction manager/general contractor to provide input during a project's design process. During the design phase, the construction manager advises on scheduling, pricing, phasing and other factors as a way to lower project costs and head off delays.

At an agreed-upon point (typically at 90 percent design completion), the agency and the construction manager negotiate a guaranteed maximum price for the construction of the project based on the scope. If the price is acceptable to both parties, a contract is executed for construction services, and the construction manager becomes the general contractor. If an agreed-upon price cannot be negotiated, the contract will be awarded via the typical design-bid-build process.

Of the six projects chosen as part of the CMGC pilot program, one construction contract has been completed (San Francisco-Oakland Bay Bridge Foundation Removal – bid package 1), and four construction contracts have been awarded (Mariposa 140 Ferguson Slide Restoration – rock debris removal, SFOBB Foundation Removal – final bid package, Fresno Highway 99 Realignment – early work bid package and Fresno Highway 99 Realignment – final bid package). The status of all six projects are listed in the table on page 38.

Caltrans project teams are tracking potential innovations and cost savings identified by the contractor during the design phase. Caltrans estimates that the CMGC process yielded cost savings of about $15 million for the first stage of the SFOBB Foundation Removal due to input from the construction manager/contractor during the design process. In addition, the contract was completed on time, and a new method of demolition was utilized on which Caltrans had no prior experience.

The new process has produced its set of challenges, the report noted, including the need to develop new documents and processes. Caltrans developed its CMGC processes and contract documents based on best practices from other state departments of transportation with mature CMGC programs. Caltrans also solicited industry comments on the contract documents and processes. After each procurement, Caltrans provides debriefings for each proposing team. This allows an opportunity to share the strengths and weaknesses of their submittals, as well as feedback on the selection process.

Another challenge identified so far is the reconciliation of differences in estimates between Caltrans using historical bid-based data and the contractor using a production-based approach in their respective estimates. Consequently, Caltrans has hired an Independent Cost Estimator (ICE) to assist in the reconciliation process of the non-binding "Opinion of Probable Construction Costs" submitted at different design stages of the project, and the guaranteed maximum price.

Based on Caltrans' experience to date, Caltrans considers the use of an ICE as a best management practice for the CMGC process.

To this point, comments from industry have been extremely positive and supportive of the CMGC Pilot Program, the report noted.

Caltrans will continue to identify challenges and best practices as the projects move towards completion. In addition, Caltrans was given authority by AB 2126, signed into law by Gov. Edmund G. Brown Jr. in September 2016, to apply the CMGC process to another six construction projects. MM

Source: *Caltrans Annual Progress Report – Construction Manager/General Contractor Pilot Program*

Construction Manager/General Contractor Pilot Program Selected Projects

Project	Description	Estimated Cost	Status	Stage of Completion	Estimated Date of Completion
Foundation Removal	Remove existing marine foundation	$130 million	Awarded to Kiewit/Manson A Joint Venture	One construction package completed. The second and final construction package awarded and under construction.	Dec. 2018
Freway 99 Realignment	Realign Route 99 to accommodate High Speed Rail	$111 million	Awarded to Granite Construction Company	One construction package awarded and under construction. The second and final construction package awarded.	March 2018
Reconstruct Interchange	Reconstruct Barton Road Interchange	$79 million	Awarded to Myers-Rados, A Joint Venture	Preconstruction Phase	Mid-2018
Southbound 58 Upgrade	Convert 2-lane conventional highway to 4-lane expressway	$158 million	Awarded to Kiewit Infrastructure West Co.	Preconstruction Phase	Mid-2020
MPA 140 Ferguson Slide Restoration	Construct 2-lane highway on new alignment	$52 million	Awarded to Myers and Sons/RL Wadsworth Joint Venture	Preconstruction Phase. One construction package awarded and under construction.	Fall 2018
I-5 North Coast Corridor (27 miles)	Improve I-5, Rail, and Transit in the North Coast Corridor	$606 million	Awarded to Flatiron-Skanska- Stacy and Whitbeck (FSSW) a Joint Venture	Preconstruction Phase	Summer 2020

Source: *Annual Progress Report – Assembly Bill 2498 – Construction Manager/General Contractor Pilot Program*

Districts and **Information**

Leadership

Edmund G. Brown Jr.
Governor, State of California

Brian P. Kelly
Secretary, California State Transportation Agency

Malcolm Dougherty
Caltrans Director

Kome Ajise
Caltrans Chief Deputy Director

Will Shuck
Deputy Director, Caltrans External Affairs

Mile**Marker** Staff

Steve Breen
Editor

Gary Chazen
Writer

Daniel DeFoe
Graphic Designer

William Hall, Steven Hellon, John Huseby, Scott Lorenzo
Photographers

For individuals with sensory disabilities, this document is available in alternative formats. For information, call (916) 654-5782 (Voice) or 711 (TTY) or write: Caltrans Public Affairs, 1120 N Street, MS-49, Sacramento, CA 95814

Helpful Links for This Issue

California Department of Transportation

Mile Marker Archives

Active Transportation Program

California Road Charge Pilot Program

Caltrans Division of Maintenance

Caltrans Division of Rail and Mass Transportation Caltrans Strategic Management Plan

Cap-and-Trade Program

Fish Passage Design for Road Crossings Moving Ahead for Progress in the 21st Century Act State

Highway Operation Protection Program

Transportation Asset Management Plan

Zero-Emission Vehicles Action Plan (2016)

From the **Archives**

Using a folding yardstick, a worker checks grade measurements on what will become the San Diego Freeway in Capistrano Beach, July 7, 1960. Photograph by Sat Yoshizato.

Caltrans